



Road work

Work to widen Space Center Blvd. is expected to begin this week, but shouldn't affect traffic flow much. Story on Page 4.



Picnic plans

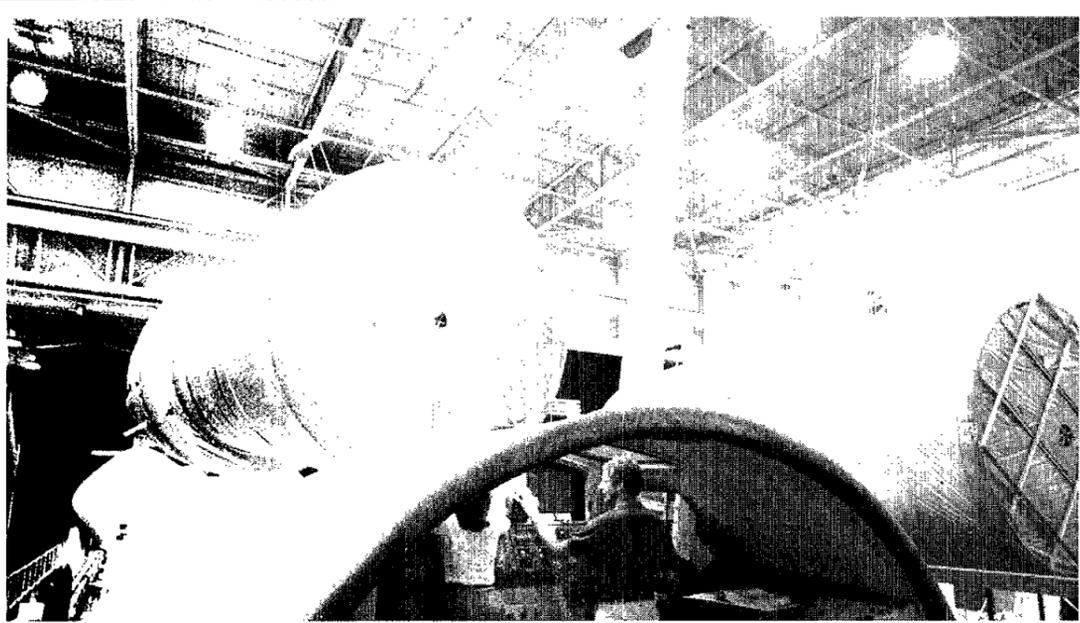
Plans for this year's JSC Picnic, scheduled for May 5, are firming up, according to organizers. Story on Page 4.

# Space News Roundup

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No. 13



JSC Photo

STS-31 Mission Specialist Steve Hawley and trainer Shannon O'Roark practice deployment of the Hubble Space Telescope in Bldg. 9A. Hawley is using the Manipulator Development Facility's ability to mimic the shuttle's remote manipulator system and a neutrally buoyant helium-filled model of the telescope to simulate deployment.

## New glasses for human minds

Fundamental discoveries expected from space telescope

By Kelly Humphries

When the light of the universe reaches the precision-ground mirrors of the Hubble Space Telescope for the first time, a new era of astronomy and a new awareness of how humans fit in the cosmos will begin.

The telescope, named for astronomer Edwin P. Hubble whose work in the early part of this century revealed a much larger universe than anyone had imagined, will be half a billion times more sensitive than the human eye and have better resolution by a factor of 10 than any previous optical telescope.

"We'll be like the little nearsighted child in the classroom that is given a pair of glasses and at last can see what the teacher has been writing on the blackboard," said Lennard Fisk, NASA associate administrator for space science and applications. "Never before has humankind had the opportunity to increase its knowledge of the universe more rapidly than we will in the 1990s."

The telescope will allow humans to see some of the earliest objects in the universe, see for certain whether there are planets orbiting other stars, learn how the universe evolved into its present complexity, and glean evidence about whether our universe will always be expanding or if someday it will begin to contract.

Its launch is a turning point in humankind's perception of itself and its place in the universe, Fisk said, and will reveal the mind-numbing vastness of

the universe with its countless galaxies spread over billions of light years.

"If you ask the average proverbial man or woman on the street to name a space science mission, the first one that comes to mind is Hubble," Fisk said. "It's a recognition of humankind's intrinsic curiosity about understanding the universe in which they live, and a recognition that this is a mission from which they can expect very fundamental discoveries. They expect to be rewarded, their curiosity satisfied by this mission."

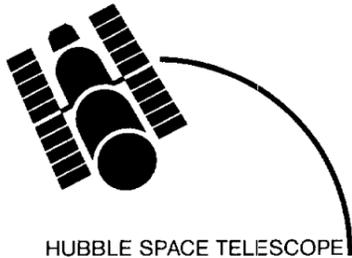
But the greatest scientific achievements the telescope makes probably are not yet imagined.

"It's hard to predict what discoveries we'll make," said astronomer and STS-31 Mission Specialist Steve Hawley, who will guide *Discovery's* robot arm as it deploys the telescope next month. "Clearly, we'll understand a lot of the questions that perplex us today and

develop new and more profound questions in the future. It really is like taking an observatory from the ground and putting it in space where you derive all the advantages of not having to observe through the atmosphere."

The Hubble Space Telescope (HST) will be lifted out of *Discovery's* payload bay on the second day of the STS-31 mission, now scheduled to lift off April 12 at 8:21 a.m. CDT.

Please see **HUBBLE**, Page 3



HUBBLE SPACE TELESCOPE

## Bugs bow out; Hubble steps into cargo bay

By Kyle Herring

Shuttle managers are meeting today and tomorrow to determine final readiness of *Discovery* and the Hubble Space Telescope for launch on mission STS-31 early next month.

Despite a few "bugs" that cropped up following *Discovery's* transfer from the Vehicle Assembly Building to the launch pad, preparations for launch about April 12 are progressing. With a smoother than normal flow, managers are

discussing the possibility of moving the launch from April 12 to April 10.

Launch on April 12 could occur during a four-hour window opening at 8:21 a.m. CDT. The window for an April 10 launch opens at 8:24 a.m.

Installation of the Hubble Space Telescope into *Discovery's* payload bay was delayed from Tuesday to Thursday while technicians worked to rid the Payload Changeout Room (PCR) of midges—insects that look like small mosquitos. The tiny bugs were considered a threat to the telescope's sensitive optics and electronics.

About 40 of the insects were found in the PCR when the Rotating Service Structure (RSS) was moved into position alongside the orbiter. Several lighted traps with small vacuum devices and dry ice were strategically placed throughout the clean room to capture the midges.

The room lights were turned off so that the trap lights would attract the insects, which were drawn into the trap by the vacuum and killed using the dry ice.

When the midge "body count" reached zero, the okay was given to proceed with payload installation. Early Wednesday, workers removed the protective shroud from the telescope and prepared for installation yesterday morning.

Following installation of the telescope in *Discovery's* bay, all mechanical and electrical connections were to be made and an

interface verification test begun.

Work at Launch Complex 39B this week has included routine servicing of *Discovery's* on-board storage tanks, which went well. The main engine frequency response test also was conducted. During the testing workers determined that the number 3 main engine controller had to be changed out prior to flight.

Work on removal of heat shields around the engine began Wednesday morning and

replacement of the controller is expected to be completed tomorrow afternoon with little or no impact to the remaining schedule for launch.

The crew of STS-31 conducted its routine mock countdown test at Kennedy Space Center last week in preparation for the five-day mission to deploy HST. Commander Loren Shriver, Pilot Charlie Bolden and Mission Specialists Steve Hawley, Bruce McCandless and Kathy Sullivan will return to KSC three days before the actual launch.

Once the telescope is deployed into its 330 nautical mile orbit, the crew will turn its attention to operation of several middeck experiments devoted to protein crystal growth, polymer processing and the effects of weightlessness and magnetic fields on ions.

*Discovery* will complete its mission with a landing at Edwards AFB on new carbon brakes manufactured by B.F. Goodrich and tested and certified at Wright-Patterson Air Force Base, Ohio.

The new brakes are designed to have more braking power and require less maintenance than the older beryllium brakes. Each orbiter will be retrofitted with the newer brakes and continue landings at Edwards.

The carbon brake modification is the first of a number of steps to be taken for possible landing of future Shuttle missions at the Kennedy Space Center. Please see **DISCOVERY**, Page 4



## Shuttle flight to rescue satellite may be possible

There are no insurmountable technical issues in the way of a space shuttle rescue of the Intelsat VI satellite, NASA managers said last week after a meeting at JSC.

The communications satellite is currently in a useless orbit after failing to separate from the second stage of its Titan booster during an early March launch.

The meeting between NASA, the International Telecommunications Satellite Organization (Intelsat) and Hughes Aircraft Co. was held to provide the Shuttle Program Office along with representatives from Mission Operations, Flight Crew Operations and Engineering with a status of the satellite.

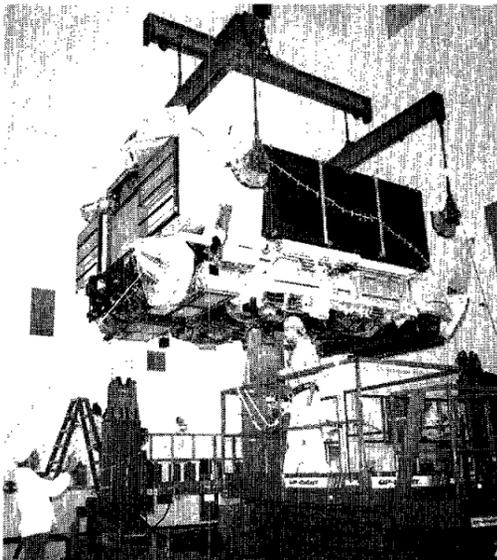
Intelsat and Hughes officials briefed NASA on the health of the spacecraft and the options of retrieving and reboosting or bringing the satellite back to Earth.

In a joint statement following the day-long meeting, the group said that "While the discussions were very preliminary, no insurmountable technical issues were identified."

Additional meetings will be held on the subject of a satellite rescue. "This initial . . . meeting was devoted to fact-finding only and no decisions were made as to whether such a mission could be accomplished," the statement said.

Some of the major issues discussed at the meeting, chaired by Shuttle Integration and Operations Manager Hal Lambert, included hardware development to accommodate the spacecraft, crew training requirements, orbiter configuration and weight constraints, and safety factors related to propellants on-board the satellite.

In the history of the space shuttle Please see **RESCUE**, Page 4



NASA Photo

**NEXT IN LINE**—Workers lift the Gamma Ray Observatory (GRO) onto a stand in Kennedy Space Center's Payload Hazardous Servicing Facility. The second of NASA's four great observatories is scheduled for launch aboard *Atlantis* in November.

## Child Care Center hires facility director

Georgia Strain has been hired as director of JSC's Child Care Center, the center's governing board announced this week.

In announcing the selection, Space Family Education Inc. President Mike Evans emphasized Strain's extensive background in administration and curriculum development with child care facilities.

Strain will begin working full time next week to complete the hiring of the center's staff, and oversee the completion of modifications necessary to open the center's doors April 30.

Strain has served for the past five years as program director at "The Children's Center," a Galveston-based facility.

The facility will hold an open house from 9 a.m. until noon on Saturday, April 7. Those interested in viewing the facility's progress, talking with the new director, and meeting other staff members are urged to attend.

Donations of toys, kitchen articles, and playground items are still needed, as well as volunteers to sew slip covers for the children's sleep mats and to work on playground and storage shelf construction projects on weekends. Children's books in good condition are also needed for the center's library.

Contact Mary Allen, x33087 or Lori Beauregard, x36600, for additional volunteer or donation information.

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# Ticket Window

The following discount tickets are available for purchase in the Bldg. 11 Exchange Gift Store from 10 a.m. to 2 p.m. weekdays.

General Cinema (valid for one year): \$3.75 each.

AMC Theater (valid until May 1991): \$3.50 each.

Sea World (San Antonio, year long): adults, \$17.25; children (3-11) \$14.75.

NASA Night at Astroworld (April 6, 6 p.m.-midnight; park is closed to the public): \$9.20 each.

Children's Easter Party (10 a.m., March 31, Gilruth Center): adults, \$1.50; children \$4.

Walt Disney on Ice (noon, April 7, the Summit) \$7.50.

## Listen!

Need the latest information on what's happening at JSC?

The JSC Employee Information Service may have just what you're looking for.

Updated every day at 11:30 a.m. the recorded announcement can be reached by calling:

# 483-6765

JSC

# Dates & Data

## Today

**Threshold Group meeting**—The Threshold Group will have a social meeting at 4:30 p.m., March 30, at the Gilruth Recreation Center. An overview about Threshold and its current activities will be presented. Any JSC civil servant may attend; contact James Sturm at x33085 for information.

**UHCL Showcase '90**—The University of Houston-Clear Lake (UHCL)'s annual open house, "Showcase '90" will be held from 1-4 p.m., April 1, in Atrium II of the Bayou Bldg. Academic advisers will be available to talk with students. Call 488-9240 for more information.

**Cafeteria menu**—Special: tuna and noodle casserole. Entrees: broiled codfish, fried shrimp, baked ham. Soup: seafood gumbo. Vegetables: corn, turnip greens, stewed tomatoes.

## Monday

**Cafeteria menu**—Special: meatballs and spaghetti. Entrees: wieners and beans, round steak with hash browns. Soup: chicken noodle. Vegetables: okra and tomatoes, carrots, whipped potatoes.

## Tuesday

**Vision-21 symposium**—The Vision-21 Symposium on Space Travel for the Next Millennium is scheduled for April 3-4 at NASA's Lewis Research Center. The symposium will look at future directions of science and technology in astronautics and space exploration. Contact Karen Molnar, MS49-6, Vision 21 Symposium, Lewis Research Center, Cleveland, Ohio 44135, 216-826-6795, for information.

**Cafeteria menu**—Special: fried chicken. Entrees: beef stew, shrimp creole, sweet and sour pork chop with fried rice. Soup: beef and barley. Vegetables: stewed tomatoes, mixed vegetables, broccoli.

## Wednesday

**JSC Astronomy seminar**—An open discussion meeting will be held from noon-1 p.m. April 4 in the Bldg. 31 conference room; contact Al Jackson at x33709 for information.

**Cafeteria menu**—Special: Swiss steak. Entrees: fried perch, New England dinner. Soup: seafood gumbo. Vegetables: Italian green beans, cabbage, carrots.

## Thursday

**Parallel computing**—The AIAA will sponsor a Parallel Computing Series of lectures from 11:45 a.m.-1 p.m. April 5, 12 and 19 at Mr. Gatti's Pizza on El Camino Real. The first lecture will concentrate on hardware. Guest speaker is Ernst Leiss, director of the Keck Research Computation Laboratory at the University of Houston. For more information, call Andre Sylvester at x31537.

**Cafeteria menu**—Special: stuffed bell pepper. Entrees: turkey and dressing, enchiladas with chili, wieners and baked beans. Soup: cream of chicken. Vegetables: zucchini, English peas, rice.

## April 6

**Cafeteria menu**—Special: Salisbury steak. Entrees: baked scrod, broiled chicken with peach half. Soup: seafood gumbo. Vegetables: cauliflower au gratin, mixed vegetables, buttered cabbage, whipped potatoes.

## April 7

**PSI Seminar**—The NASA/Clear Lake area chapter of Professional Secretaries International (PSI) is hosting a seminar entitled "The Office Team of the Nineties" by Peggy Morrow, from 9 a.m.-1 p.m., April 7, at the San Jacinto South Campus Student Center. Topics include surviving office stress, acquiring skills, avoiding procrastination, and resolving work conflicts. The cost is \$25 for non-PSI members, \$20 for

members, and \$15 for students, and includes the seminar, brunch, and door prizes; contact Cindy Thomasen, x30228, for information.

## April 9

**Health Related Fitness Program**—The first of three JSC health related fitness programs to be held in 1990 will be from 11 a.m.-4 p.m., Monday, Wednesday and Friday for 10 weeks April 9-June 29. The second course will be at 6:30 a.m., Monday, Wednesday and Friday, July 7-Sept. 21. The third will be offered at 11 a.m. and 4 p.m., Monday, Wednesday and Friday, Sept. 24-Dec. 14. Applications to participate in the program and a comprehensive physical examination are required six weeks prior to enrollment. Call x30301 or x30302 for information.

## April 10

**NCMS meeting**—The Texas Gulf-coast Chapter of the National Classification Management Society (NCMS) will hold its dinner meeting at 5:30 p.m. April 10 at the Ramada Kings Inn. Joseph Degregorio, director of industrial security, Defense Investigative Service, southwestern region, will speak. Contact Peggy Garcia, x34039, or George Guillory, 283-6618, for information and reservations (to be made no later than April 5).

## April 11

**JSC Astronomy Seminar**—A discussion of "Chaos in the Solar System" by Dr. A.A. Jackson will be held from noon to 1 p.m. in the Bldg. 31 conference room; contact Jackson at x33709 for information.

## April 16

**Orbital debris conference**—NASA, the American Institute of Aeronautics and Astronautics and the Department of Defense will sponsor an Orbital Debris Conference, "Technical

Issues and Future Directions," April 16-19 in Baltimore, Md. The conference will review accomplishments to date, work in progress and plans for the next five years for all of the sponsors as well as the European Space Agency and Japan's NASDA and ISAS.

## April 18

**Houston Space Business Roundtable**—The monthly business program will feature Emyre Robinson, president of Barrios Technology and chairman of the Texas Space Commission, speaking on the Texas Space Commission. Registration begins at 11:30 a.m., April 18, at the Nassau Bay Hilton. Tickets are \$18 for members, \$20 for non-members, and reservations are required. Call 486-5068 for information.

**JSC Astronomy seminar**—Tim Wegner will present "Fractals: A Demonstration" from noon to 1 p.m., April 18, in the Bldg. 31 conference room; contact Al Jackson at x33709 for information.

## April 19

**NPMA meeting**—The JSC National Property Management Association (NPMA) monthly dinner meeting will begin with a social at 5:30 p.m., April 19, at the Gilruth Rec Center. Lupita Armendariz, Equal Opportunity Office, will speak. Contact Sandra Pierce at 282-4151 for information.

## April 20

**NCMS special meeting**—The Texas Gulfcoast Chapter of the National Classification Management Society (NCMS) will hold a luncheon meeting at 11:30 a.m., April 20, at the Ramada Kings Inn. Steven Garfinkel, director, Information Security Oversight Office, will speak. Contact Peggy Garcia, x24039, or George Guillory, 283-6618, by April 16, for reservations.

# Swap Shop

Swap Shop ads are accepted from current and retired NASA civil service employees and on-site contractor employees. Each ad must be submitted on a separate full-sized, revised JSC Form 1452. Deadline is 5 p.m. every Friday, two weeks before the desired date of publication. Send ads to Roundup Swap Shop, Code AP3, or deliver them to the deposit box outside Rm. 147 in Bldg. 2.

## Property

Lease: 10 acres, W. of Hwy. 3, barn, ponds, util., \$200/mo. or BO. lease avail. Trey, 280-4381 or 484-7834.

Rent: Mobile home lot on Hwy. 3, \$70/mo. 1282-2802 or 332-0365.

Sale: 60 acres, 3 mi. from Karnes City, TX; 2-story house on 1.5 lots, trees, El Campo. 783-9164.

Rent: Lake Livingston, waterfront house, 3-2, CA/H, furn., decks, pier, ex. cond., wknd. wk. 482-1582.

Rent: Friendswood, 3-2-1, fenced, \$475/mo., \$300 dep. 483-8294 or 482-6816.

Sale: Bay house on Caranchua Bay, Palacios, 900 sq. ft., furn., 2 AC's, 5 dbl. beds, \$40, (409) 543-2052.

Sale: El Lago, assum., needs repairs, \$78,900. 532-4237.

Rent: Pecan Forest, LC, 3-2-2, FPL, priv. courtlyd., \$725/mo. 554-6200.

Sale: Big Bend area, 160 acres, \$120/acre, CFD 15% dn., 9% for 5 yrs. 337-4051.

Sale by owner: LM, 3-1-1, LR/DR, den, appli., fans, \$47,000. Noel, 480-4101 or (409) 935-1837.

Rent: Mobile home lot, \$85/mo., \$50/dep., Bacliff. 488-1758.

Sale: 3-2-2 Meadowgreen, approx. 1,450 sq. ft., \$75K. Francis, 892-6983 or 486-5207.

Sale: LC mobile home, 14x80, 5 yrs. old, \$23,000. Kemah lot for home bldg., 180' x 111', \$7,200. 334-1883.

Sale: 90 plus acres in Flatonia/Schulenburg area, log home, rustic foreman's house w/ barns, corral, Rick, 996-8961 or 283-1988.

Trade: 4-3, W. of Austin, prefer 5 yr. old open plan. 471-8795 or 333-6083.

Sale: 2 acres near Lake Somerville, \$5,000 cash. 338-2256.

Lease: El Dorado Way, 1 BR, FPL, W/D, \$360 plus dep. 283-6368.

Lease: Meadowgreen, 3-2-2, den, \$700/mo., no pets, no smokers. Myrna, 425-4903 or 486-7957.

Sale: Bayglen, 3-2-2, must see. 9% assum., no app., \$101,900. 480-8733.

Sale: LC/Dickinson, 3-3-2 plus, guest/game room, 1 acre, \$77,000. 534-6641.

Lease: Webs: Ellington, 2-1, new paint, carpet, W/D avail., \$425/mo. Dave, x38156 or 486-5181 or Eric, 483-8420.

Sale/Lease: Nassau Bay townhouse, 4-2-2, over 2,000 sq. ft., 2-story den, \$109,900 or \$1,095/mo. Jerry, x38922 or 488-5307.

Sale/Rent: Galv. timeshare, furn. condo, 2-2, sleeps 6, \$10,500 or \$500/wk. Steve, 282-

6930.

Sale: Lg. lots, waterfront, near NASA, mid \$30's. Don, x38039 or 333-3313.

## Cars & Trucks

'81 Pontiac Le Mans sta. wagon, reb. V-6 eng., \$1,200. x33335 or 488-7490.

'81 Olds Cutlass cruiser, ex. cond., \$1,795. David, 282-3827 or 554-5514.

'87 V-8 Firebird, T-tops, AM/FM cass., 35K mi., \$7,575. Jackie, 483-7426 or 326-5200.

'83 Nissan Sentra, 5-spd., 2-dr., one owner, ex. cond., \$1,300. Luis, x37478 or 486-8155.

'78 Ply Fury, AC, PS, \$1,250. Bob or Scotty, x35572 or 326-2120.

'65 Olds Starfire sport coupe, 106K mi., good cond., orig. owner, \$2,700. OBO. Tom, x38298 or 488-4089.

'35' Mallard motor home, loaded, low mi., \$36,000. 337-4051.

'67 Camaro SS/RS convert., 350, 4-spd., PB, PS, rally wheels, ex. cond. Kris, x32815 or 559-1341.

'86 Dodge Caravan L.E., good cond., low mi., auto., \$7,800. 333-4976 or 332-9641, ext. 378.

'76 Pontiac Bonneville, PL, PW, 55K mi., BO. 480-1582.

'88 Mits. Precis RS, 5-spd., AC, AM/FM cass., 32K mi., \$5,000. Barbara, 488-4102, x202.

'77 Suburban, new motor, trans. Pat, 332-1262.

'86 Dodge Mini-Ram van, auto., AM/FM/cass., 67K, \$5,895. 992-1996.

'84 Honda Civic, 4-dr. sedan, auto., AM/FM/cass., \$3,400. OBO. Vic, 282-3216 or 334-2335.

'85 Continental Mark 7, 41K, ex. cond., \$9,200. 280-5909 or 534-4018.

'79 Olds Cutlass, auto., AM/FM cass., good cond., 30K on reb. eng., \$1,500. OBO. Chris, x37796 or 488-6790.

'80 elec. car, 40 mile range, 38mph cruising, on-board charger, \$1,800. 532-4784.

'81 Cordoba, stereo cass., w/tilt steering, \$600. 483-8183 or 474-7262.

## Cycles

'86 Suzuki Savage, 650cc, less than 7K mi., ex. cond., \$1,100. x33335 or 488-7490.

'74 Yamaha 650 w/windjammer, \$700. Robin, 282-3452.

'79 Honda Elsinore 125, ex. cond., \$500. x33165.

10-spd. bicycle, ex. cond., \$95. OBO. Daryle, 282-3200.

'83 Suzuki GN125cc, low mi. 474-7006.

'85 Honda Elite scooter w/helmet, \$500; '85 Honda Nighthawk, \$1,000. OBO. Amy or Patrick, 488-1988 or 488-8643.

'85 Honda, 110 3-wheeler, \$550. 338-2256.

'78 Kawasaki KZ650, less than 7K mi., w/helmet. Steve, x35806 or 333-4222.

## Boats & Planes

'83 25' Catalina, 7.5hp Johnson, 6 sails incl. Spinnaker, VHF, AM/FM stereo cass., EZ loader dbl. tandem trlr., \$13,500. OBO. 474-5414.

16' Chrysler fiberglass trihull boat, 120hp, water ski tow bar, galv. trlr., good cond., motor needs repair, \$700. Bob, 283-4146.

'81 NACRA 5.2 catamaran, 2 sets of sails. Andy, 283-4096 or Scott, 283-4109.

16' boat, walk-thru windshield, 70hp OB Merc., Sportsman tilt trlr.; 15' boat, walk-thru windshield, 85hp OB Johnson, pwr.-trim, tilt trlr., \$1,600/ea. x31484 or 332-1336.

Kayak w/spray skirt, \$110. 523-7200.

'81 Honda sailboat hunter 22, 7.5 outbd., '85 roller jib, swing keel, sleeps 4, good cond. 488-1313.

13' AMF sailboat, \$200. x30838 or 333-2769.

'79 Renegade 16' ski boat, 140hp Evinrude OB, SST prop, ex. cond., \$3,750 nego. 486-7846 or 333-6868.

'75 V-20 Wellcraft center console, 140 MERC cruiser, tandem trlr., \$4,395. 483-8456 or (409) 935-4198.

## Audiovisual & Computers

TI 994A computer, exp. box, software, BO. 974-5414.

Radio Shack TRC 421A 40 chan. CB w/recharg. 12 volt batt., \$30; AM/FM stereo w/turn-table and spkrs., \$25. x37267 or 554-6628.

Bearcat/Uniden scanner, 10 chan. prog. base unit, Fire/Med./Police/etc., ex. cond., \$100. 474-7006.

Pre-wired car stereo sprk. enclosure w/2 10" poly-propylene woofers, 150 watts per chan. pwr. rating, \$60. Paul, 282-3734 or 488-3653.

Sanyo stereo sys., AM/FM, dual cass., equalizer, turntable, complete w/stereo cabinet w/glass door, \$75, ex. cond. Paul, 282-3234 or 488-3653.

Macintosh 512 w/elec. 2 meg RAM, ext. drive carrying case, \$750; Yamaha receiver, 30 watts, \$125. 523-7200.

Household

Dinette set, smoked glass round top, 4 chairs, \$200. Jackie, 483-7426 or 326-5200.

Beige hide-a-bed, queen size, \$100; 4-dwr. desk, \$25. 326-1483.

Round 42" dinette table w/4 roller chairs, \$75. 483-0554 or 486-4369.

Dinette table, brass w/glass top table, 4 rattan back chairs, ex. cond., \$75. Paul, 282-3234 or 488-3653.

Med. brn. carpeting w/pad, 60 yds., ex. quality, \$250. OBO. 280-9870.

Swivel recliner, burgundy, like new, \$50. 480-5060.

17" color Zenith TV, works good, \$80. 333-3630 or 554-6669.

16 cu. ft. self defrost refrig. w/top freezer, runs good, \$85. 333-3630 or 554-6669.

Whirlpool elec. dryer, works fine, \$100. OBO. 283-5496 or 332-1614.

King-size, motionless waterbed w/oak cabinet hdbd., bumper pads, \$425. 482-0626.

## Musical Instruments

Crate KBA 150 guitar/keyboard amp w/2 yr. warr., \$350. Curt, x31818 or 996-8877.

Alpha-1 elec. guitar and custom amp w/reverb, \$200. Stacey, x32649 or 480-9793.

Yamaha-50 classical guitar, \$150. 333-7346.

## Lost & Found

Lost: 6-spd. Raleigh bike from Mission Control Center. Jon, x37671.

## Photographic

Canon 35mm camera w/AEC, works fine, \$75. 283-5496 or 332-1614.

## Pets & Livestock

Baby cockatiels, 7 wks. old, \$35. Linda, 484-7834.

CFA Persians, lilac, copper eyes, F, sealpoint Himalayan, M, blue eyes, both 2 yrs. old, \$285; CFA pers. kittens, 1 blue F, copper eyes, born 2-1-90, \$250-275. 483-0439 or 473-0390.

Easter rabbits, \$10-17, incl. feed and instruc. 554-6200.

Golden Retriever, AKC med. brn. pup, 7-8 mos. 480-8733.

## Wanted

Want Atari 5200 game or working joystick. 282-2802 or 332-0365.

Want Atari 5200 game cartridges. Daryl, 483-5362.

Want Chevy, GMC or Ford SWB PU, '75 or later, running or not. Phillip, x37260 or Gary, 479-0306.

Want Station Wagon, American lg. mobile w/good eng./trans., ext./int. damage OK, \$800 range. John, x39147.

Want nonfunctioning character telephone. Sue, 333-4553 or 334-1934.

Want sm. office or home paper shredder. 738-2053.

Want roommate to share Univ. Green townhouse, non-smoker, \$300/mo., all bills paid. Dawn, 280-0642 or 333-6329.

Want Volvo 15" turbo wheel, 5 spokes, in good cond. Vincent, x30874 or 333-1316.

Want refrig., tricycles, rec./tape players, can openers, toasters, and asst. infant warming dishes and microwave dishes to be donated or purc. at reas. cost to JSC Child Care Center. Mary Allen, x33087.

Want trlr. for 12' Jon boat, fixer-upper OK, 283-4087 or 480-3110.

Want daybed for reas. price. 486-6111.

Want non-smoking roommate to share 2 BR house off Egret Bay Blvd., \$200/mo. plus 1/2 util. Rick, x36042 or 332-7695.

## Miscellaneous

Tour Model III irons, 1-9, PW & SW, \$18.20/ea. metal woods, \$30/ea. David, 554-5514.

New paint, 3 gal. Cape Biscayne blue satin ext. paint, \$40; 1 gal. sky blue satin, \$15; 1 gal. sky blue epoxy, \$40, sell all for \$75, Sears/Sherwin-Williams. Robin, 282-3452.

# Hubble Space Telescope

## New era in astronomy dawns, a turning point in humankind's perception of itself and its place in the universe

(Continued from Page 1)

Commander Loren Shriver and Pilot Charlie Bolden will pilot the space shuttle into a direct-insertion 330 nautical mile orbit, the highest a space shuttle has ever been. Two maneuvering engine burns will circularize the orbit.

On Flight Day 1, *Discovery's* cabin will be depressurized to 10.2 pounds per square inch (psi), which will allow Mission Specialists Bruce McCandless and Kathy Sullivan to leave the crew cabin within two hours for any unscheduled space walk, or extravehicular activity, that may be needed to assist in the deployment of HST.

On Flight Day 2, Hawley will power up the remote manipulator system (RMS) and grab HST by its starboard grapple fixture. The payload retention latches will be released and the umbilicals supplying orbiter power to HST systems will be unplugged. Hawley, using the RMS, will lift the telescope into a low hover position, turn it 90 degrees to gain clearance and finish lifting it into a high hover position. A 90-degree pitch maneuver will put the satellite in position for its solar arrays and high gain antennas to be deployed. When ground support control rooms at JSC, Goddard Space Flight Center and Marshall Space Flight Center are satisfied, the crew will be given the go-ahead to release HST. Hawley will check with Shriver to make sure the telescope and shuttle are in the proper attitude with respect to each other and release the grapple fixture's hold.

*Discovery* will move away from the telescope and keep station 40 miles behind its payload for 45 hours, maintaining the option of a space walk to take care of any contingency.

"I feel quite honored to be in this position, to be able to manage this operations team," said Lead Flight Director Bill Reeves. "Unfortunately, we seem to get a lot of the attention when there are literally tens of thousands of very skilled and dedicated people who have put a lot into this flight."

The idea of putting a telescope into orbit, where it can be free of the atmospheric disturbances that muddle sight and filter out many light wavelengths invisible to the human eye, was first proposed by the German scientist Hermann Oberth in 1923. In 1962, four years after NASA was established, a National Academy of Sciences study group recommended development of a large space telescope as a long-range goal. NASA selected a team of scientists in 1973 to establish the basic design.

In 1977, the team was expanded to include some 60 scientists from 38 institutions and Congress authorized funding for the project.

Marshall Space Flight Center was assigned responsibility for design, development and construction. Goddard Space Flight Center was chosen to lead development of the scientific instruments and ground control center. The European Space Agency, which is providing the solar arrays and Faint Object Camera for HST, joined the project in 1975. The Space Telescope Institute on the campus of Johns Hopkins University in Baltimore, was dedicated in 1983 to perform science planning for HST. The Space Telescope Operations Control Center (STOCC) was established at Goddard in 1985.

Development, construction and assembly of the telescope, which will have cost \$1.544 billion 30 days after launch, began in 1977. Lockheed Missiles and Space Co., Sunnyvale, Calif., designed and developed the support systems module and was responsible for systems engineering, assembly and verification. The precision-ground 94-inch primary mirror was completed in 1981 and the optical assembly was delivered in 1984. Assembly was completed in

1985. Launch was originally scheduled for 1986, but was delayed by the *Challenger* accident and recovery. Engineers used the interim for extensive reliability testing and maintainability planning. Operational costs are expected to be about \$200 million a year. The first maintenance visit is scheduled for 1993.

"This is the first satellite specifically

is no other spacecraft system at this time and probably not for quite a number of years, that will have the technical capability and the management courage to commit a mission going up to a telescope, capturing it, bringing it aboard, repairing it and putting it back out there."

The telescope itself is 43 feet long, 14 feet in diameter at its widest point, and weighs about 25,000 pounds. The optical telescope assembly contains two mirrors that will collect and focus light from the objects being observed. The mirrors, made by Perkin Elmer Corp. of Danbury, Conn., are of ground glass with an aluminum and magnesium fluoride reflecting surface—the smoothest large mirror ever made.

If the mirror could be scaled up to the diameter of the Earth, its highest peak would be no more than five inches tall. In contrast, an ordinary eyeglass lens scaled up to that size would have mountains as tall as the Empire State Building. The four-millionths of an inch thick coating, if removed from the mirror and thrown into the air, would float for days like a fine mist.

A 12-inch secondary mirror is located 16 feet in front of the primary mirror. During observations, light will travel through the telescope tube to the primary mirror. It will be reflected from the primary mirror back to the secondary mirror, where the beam will begin to narrow and intensify. It will pass through a two-foot hole in the center of the primary mirror to a focal plane where the scientific instruments are located.

HST's scientific instruments are the Wide Field/Planetary Camera, the Faint Object Camera, the Goddard High Resolution Spectrograph, the Faint Object Spectrograph and the High Speed Photometer. The precision point control system is sometimes called the sixth scientific instrument because it also performs scientific measurements.

The Wide Field/Planetary Camera will be used to investigate the age of the universe and search for new planetary systems around young stars. It can be used in two ways—to take pictures of dozens or hundreds of distant galaxies at once, or to provide close-ups of all of the planets in our solar system except Mercury, which is too close to the Sun for safe pointing.

The Wide Field/Planetary Camera will be able to photograph the entire facing hemisphere of planets in our solar system with a sharpness equivalent to being able to read a license plate from 30 miles away.

The Faint Object Camera will be able to photograph stars five times farther away than is possible with ground

### Vital Statistics

Length: 13.1 m (43.5 ft)  
 Diameter: 4.27 m (14.0 ft)  
 Weight: 11,000 kg (25,500 lb)  
 Focal Ratio: f/24

### Primary Mirror

Diameter: 2.4 m (94.5 in.)  
 Weight: 826 kg (1,825 lb)  
 Reflecting Surface: Ultra-low expansion glass covered by aluminum with magnesium-fluoride coating

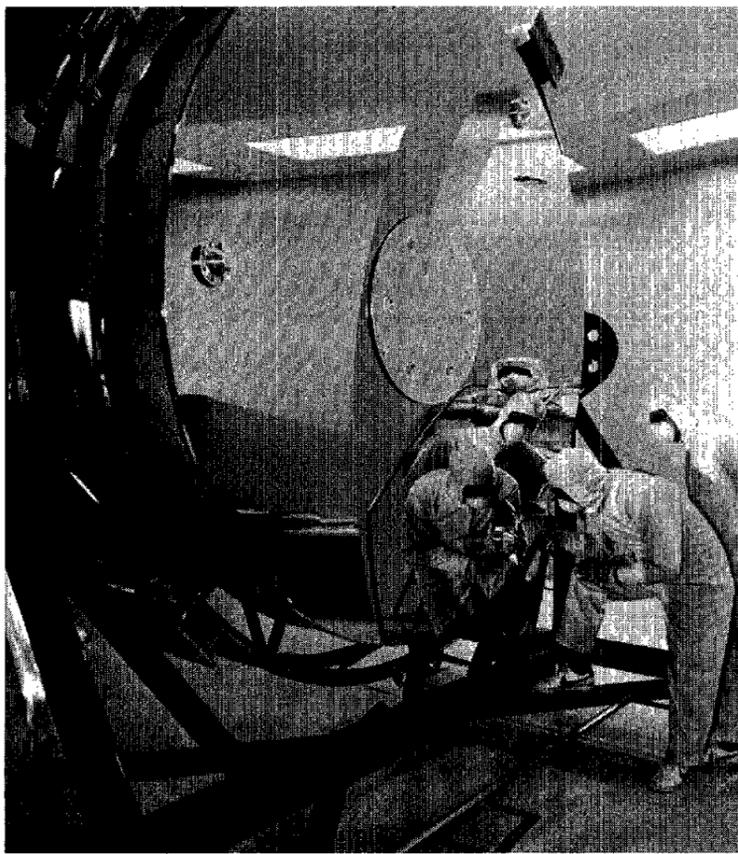
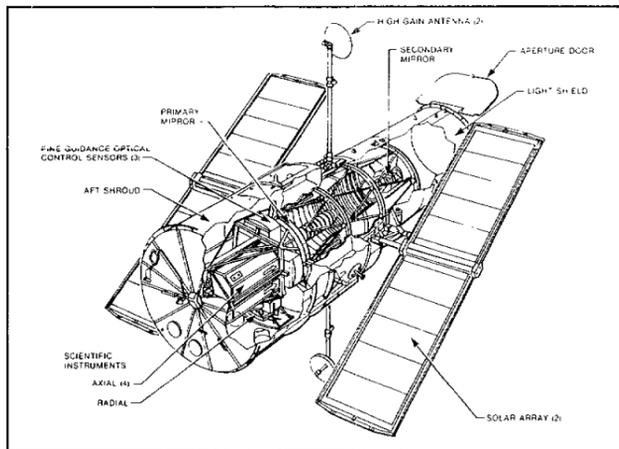
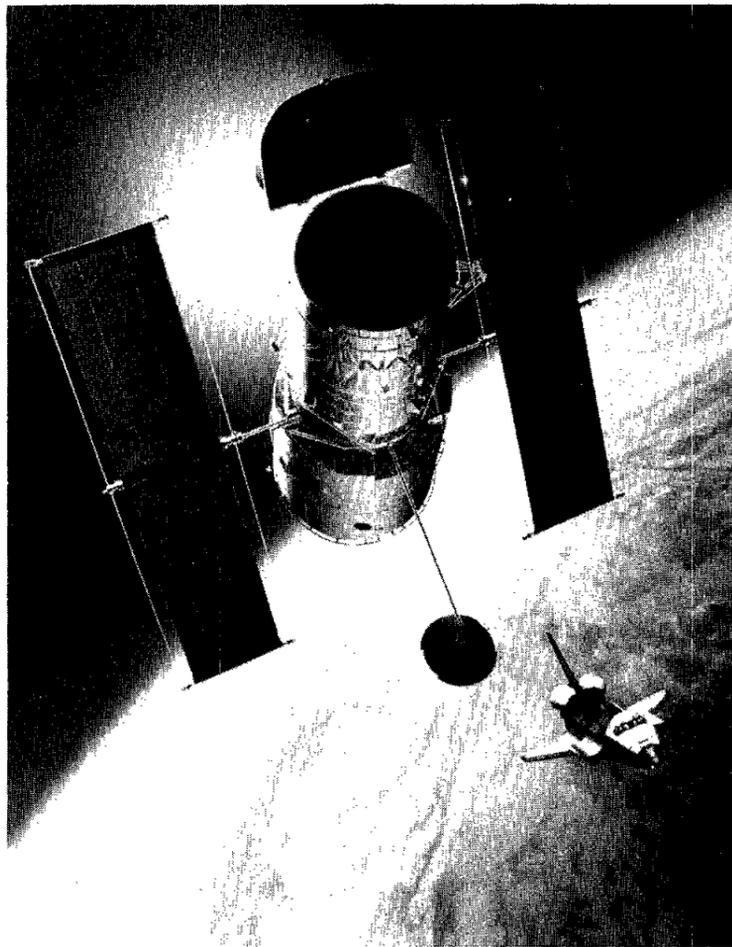
### Secondary Mirror

Diameter: 0.3 m (12 in.)  
 Weight: 12.3 kg (27.4 lb)  
 Reflecting Surface: Ultra-low expansion glass covered by aluminum with magnesium-fluoride coating

### Systems

- Optical Telescope Assembly
- Support Systems Module
- Focal Plane Science Instruments
  - Wide Field/Planetary Camera
  - Faint Object Camera
  - Faint Object Spectrograph
  - High Speed Photometer
  - Fine Guidance Sensors (for astrometry)

Data Rate: Up to 1 mbps



Top: An artist's concept of the Hubble Space Telescope being deployed. Right: Technicians at Perkin-Elmer's optical facilities in Wilton, Conn., inspect the 94-inch primary mirror following a coating of the aluminum and magnesium fluoride reflective surface.

## Leestma acting FCOD deputy

Astronaut David C. Leestma has been appointed acting deputy director of Flight Crew Operations while Bryan O'Connor is in training for his upcoming space shuttle mission.

O'Connor, a Marine Corps colonel who became deputy director in August 1989, is commander of the STS-40 Space Life Sciences mission scheduled for launch Aug. 29. He will return to his deputy director post following completion of the flight.

Leestma, who last flew as a mission specialist on STS-28 in August 1989, will be responsible for assisting the director in operational planning, directing and managing of flight crew and aircraft operations activities at JSC.

### Algranti assistant director of FCOD

Joseph S. Algranti has been named assistant director of Flight Crew Operations, a new position in the directorate, effective Feb. 25.

JSC

## People

Algranti will be third in command, with specific responsibilities for managing the Shuttle Carrier Aircraft 2 program and a Shuttle Training Aircraft replacement proposal, providing technical management and coordination of the agency's astro-

naut training aircraft T-38 avionics upgrade program with the Department of Defense. He'll also be in charge of developing agency and center requirements for establishment and maintenance of a JSC aircraft facility and supporting services for aircraft in the El Paso area.

Algranti joined the National Advisory Committee for Aeronautics, which later became NASA, in 1951 at the Lewis Research Center. He has been chief of the Aircraft Operations Division at JSC since 1962.

### Naughton acting director of aircraft operations

Robert J. Naughton, who has been



O'Connor

Leestma

Algranti

Naughton

deputy chief of aircraft operations in May 1989, has been designated acting chief.

As acting chief, Naughton will be responsible for management of all JSC aircraft operations support and a fleet of 35 planes that include the T-38 astronaut training aircraft, Shuttle Training Aircraft and Shuttle

Aircraft.

Naughton, a retired Navy captain, was in the service for 27 years, six of them as a Vietnam prisoner of war. He retired as commanding officer of Naval Air Station Dallas in 1987, and worked in Dallas as an engineering manager before coming to JSC.



JSC Photo

**MORE CONSTRUCTION IN OFFING**—A survey crew from Dietrich Engineering takes measurements on Avenue E, the Credit Union road, in preparation for this year's upcoming construction project. Avenue E will be widened to four lanes so that Saturn Lane extends from Bay Area Blvd. to NASA Road 1 and becomes a public thoroughfare. The project is designed to provide better public access to the new visitor center, Space Center Houston.

## Space Center widening to begin

By Linda Copley

Construction to widen Space Center Blvd. at the northwest corner of JSC begins next week. Project contractor Brown & Root USA, Inc., anticipates a construction period of 190 working days.

"The widening of Space Center Blvd. to four lanes between NASA Road 1 and the center's Avenue B west gate will move a great deal of traffic more efficiently," said Don Holick, Facility Planning Office.

The work will also provide employees, contractor personnel, and area residents with a less congested alternate route between NASA 1 and Bay Area Blvd. when the planned widening of NASA 1 begins in 1993, according to Holick.

Work planned includes the construction of two additional traffic lanes on the north side of the existing Space Center Blvd. between Sky-walker Drive and NASA 1. In addition, new traffic signals are planned

at the Space Center Blvd./Middlebrook Drive intersection; new loop detectors at the Space Center Blvd./NASA 1 intersection; and new traffic signal controllers at both JSC gates. Minor ditch work also will improve drainage.

Impact on traffic is expected to be minimal, except for some paving in the area of the west Avenue B gate, and with traffic signal controllers both at both the east and west gates on Avenue B.

## Board announces senior promotions

JSC's Senior Promotion Board approved 29 nominees for dual career ladder promotions in March, based principally on expanding job responsibilities and scientific and engineering impact.

The promotions to the GS-14 and -15 levels were made separate from those selected through the Competitive Placement Plan in an effort to ensure that nominees in both paths receive consideration.

Those receiving promotions, which became effective March 25, are:

Flight Crew Operations Directorate: Arthur C. Beall and Stephen J. Feaster.

Mission Operations Directorate: Charles H. Armstrong and Joseph N. DeAtkine.

Engineering Directorate: Alice L. Aman, Jack J. Barneburg, Donald F. Hughes, Malcom E. Jones, Herbert C. Kavanaugh Jr., Chien Li, Robert J. Marala, Reagan S. Redman, William F. Ritz and Oron L. Schmidt.

Mission Support Directorate: Bedford F. Cockrell.

Space Shuttle Program Office: Anne F. Ellis, Jimmie L. Gibbons and Karl L. Kotila.

New Initiatives Office: Leo G. Monford Jr. and Robert L. Spann.

Space Station Projects Office: Faith L. Bryan, Jerry C. Elliott and Keith A. Reiley.

Space and Life Sciences Directorate: Guatam D. Badhwar, Jeanne L. Crews, Deborah L. Harm, David E. Pitts, Richard L. Sauer and James M. Waligora.

## Technology Help Desk opens

JSC is establishing a Technology Help Desk to identify and serve the need for easy access to information on that subject.

The help desk and its associated technology databases will be an evolving capability. Currently sponsored by the JSC Mission Operations Efficiency Study, it will focus initially on mission operations support.

The information available includes—but is not limited to—advanced automation, computer hardware and software, expert systems, communications and networks,

data storage and retrieval, visual display, robotics and management technologies.

Services available may include subject definitions, encyclopedia-type information, specification data, reference data, bibliographies, information on training opportunities, names and locations of experts, evaluation data and examples of past and current applications.

Inquiries may be initiated by telephone (x30994), NASAMAIL (TECHHELP), fax (x35200), or JSC mail (Code FD).

## JSC Picnic theme is 'Decade of Discovery'

The 1990 JSC employee picnic has been scheduled from 11 a.m. to 5 p.m., Saturday, May 5, at the Gilruth Recreation Center. Tickets go on sale the first week of April in the Bldg. 3 employee cafeteria and will be available through May 2.

This year's winning picnic theme, "Decade of Discovery," was submitted by Jim Cooper, deputy manager of the Cargo Engineering Office. Cooper was awarded a \$75 savings bond, two picnic tickets, and two official JSC picnic committee T-shirts, in this year's special shade of fluorescent hot pink.

Day-long activities for both children and adults are planned, including bingo, horseshoes, dunk tank, obstacle course, "anything goes" events, and pony and buggy rides. A teen band, the adult band "Popkorn," cloggers, Mexican dancers and a magician will perform. Face painters and a surprise visitor also are planned.

Tickets are \$4 for adults and \$2.50 for children, and include a barbecue lunch, iced tea, lemonade, ice cream, popcorn, and snowcones. The barbecue lunch will be catered by "The Feed Store."



JSC Photo

**PICNIC PROGRESS**—The 1990 JSC Employee Picnic committee members chose Dan Cooper's "Decade of Discovery" theme suggestion. Pictured are board members (left to right, top row): John Marcucci, David Ober, Robby Dunlap, Mike Fohey, Brian Bounds, Ron Epps, Rod Loe, Dale Martin, and Dick McMinimy; (bottom row) Melody Goss, Monica Kruest, Ruby Summers, Mary Wylie, Ann Patterson, Cooper, Norma McMinimy, Susanne Malof, Kathy Bradley, Ginger Gibson, and Vickie Cantrell.

## New vehicle decals required by April 6

New JSC vehicle decals have been issued and are required for entry to the center beginning April 6. Civil servants will get blue decals; on-site contractors red.

If you have not yet obtained a new decal, copies of JSC Form 1572, the Vehicle Registration Record, are available in Bldgs. 1, 5, 30 and 100, the JSC Security Division office in Bldg. 45, Rm. 211, and in contractor security offices. A permanent NASA/JSC badge and a valid driver's license, along with the completed form, must be presented at Bldg. 100.

The old decals need not be turned in, but must be removed from vehicles by the April 6 deadline.

## Rescue attempt possible

(Continued on Page 4)

program, several rescue/salvage missions have been conducted:

- In April 1984, STS-41C *Challenger* Astronauts Pinky Nelson and James "Ox" van Hoften repaired the Solar Maximum Mission (SMM) satellite and Mission Specialist Terry Hart redeployed the SMM, which operated for an additional six years.

- In November 1984, *Discovery's* STS-51A mission was to deploy two satellites and retrieve and return to Earth two more. Westar VI and Palapa B2, deployed on STS-41B, had become stuck in useless orbits.

Mission Specialist Anna Fisher guided the two satellites into the payload bay after Joe Allen and Dale Gardner grappled them during extravehicular activities. The satellites are awaiting relaunch aboard expendable rockets.

- In August 1985, *Discovery* again was sent to deploy three satellites and to repair the Syncom IV-3 which failed to fire its booster after deployment on STS-51D. Van Hoften and Bill Fisher retrieved the satellite and replaced an electronics box which failed to arm the booster motor.

## Space News Roundup

The **Roundup** is an official publication of the National Aeronautics and Space Administration, Lyndon B. Johnson Space Center, Houston, Texas, and is published every Friday by the Public Affairs Office for all space center employees.

Editor . . . . . Kelly Humphries  
Assoc. Editor . . . . . Linda Copley

## Quality Partnership Award nominations due

Nominations for the JSC Quality Partnership Award must be received by April 13. The award recognizes JSC employees and contractors not employed in the safety, reliability, and quality assurance disciplines, for their contributions to quality. They'll be presented at the end of April.

The nominee's contributions must have been in the year prior to April.

Nominations should include a summary of the contribution and a brief biography, the name, work address and phone number of the nominator, and should be sent to H.T. Briggs, Code ND.

## Discovery launch preparations progressing

Continued from Page 1

Space Center's Shuttle Landing Facility to further reduce the turnaround time between flights.

The carbon brakes were certified for up to 82 million foot pounds of

energy absorption to allow for quicker stopping when needed for possible abort landings on shorter runways. By comparison, it takes about 10,000 foot pounds of energy to stop the average automobile. NASA-JSC